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DEVELOPMENT OF THE PETROCHEMICAL INDUSTRY IN ARGENTINA[1]

by

[illegible]

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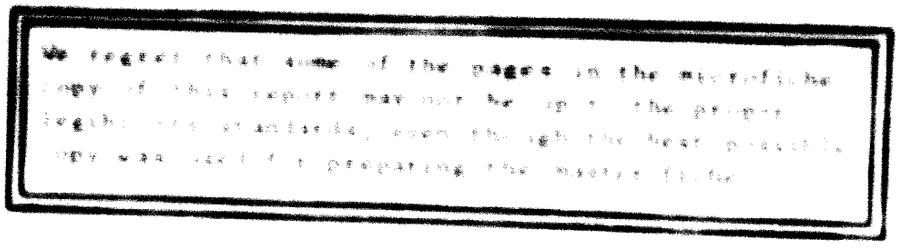


[illegible] engineers [illegible] the [illegible] adapted [illegible]

[illegible] private [illegible] chemical enterprises. I also wish [illegible] who deciphered and reproduced all [illegible] drafts [illegible]

C.C.Z.

CONTENTS

A. DEVELOPMENT OF THE ARGENTINE PETROCHEMICAL INDUSTRY

1. Argentina [illegible]

2. [illegible] and development [illegible] 1974.
   2.2. [illegible]

3. Share of [illegible] petrochemical [illegible] industries in the Gross Domestic Product [illegible] the Gross Value of Production (GVP).
   3.1. Regarding the Gross Domestic Product. 3. . Regarding the Gross Value of Production.

4. [illegible] of petrochemicals [illegible] external trade.
   4.1. [illegible] 4.2. [illegible]

5. Availability of raw materials. 5.1. Petroleum. 5.2. Natural gas. 5.3. Refinery gas. 5. . Propane and butanes.

6. Installed capacity, output, trade projected demand and prices.
   6.1. Installed capacity, output and trade (197). 6.2. Installed capacity in 19 , output [illegible] prices. 6.3. Projection of demand for the [illegible] petrochemical products (1975).

7. Cost structure of plants producing ethylene in Argentina.

8. Investments in the petrochemical sector.

9. Promotional enactments relevant to the petrochemical industry.
   9.1. Acts Nos. 14780 and 14781. 9.2. Decrees 5339/ 3 and 1756/58.
   9.3. [illegible] regulations and special regulations; act 17 10 (operative in Tucumán).

10. Specific promotional provisions for the petrochemical industry: decree 4271 (August 19). 10.1. Benefits. 10.2. Requirements. 10.3. Decentralization. 10.4. The special case of fertilizers.

11. Petrochemical and allied plants in Argentina.

12. Annexes.

B. FUTURE PROJECTS

C. PROBLEMS CONFRONTING THE ARGENTINE PETROCHEMICAL INDUSTRY. 1. Economies of scale and idle capacity. 2. Accelerated development of the petrochemical sector within the context of normal development of industry as a whole.

D. TECHNICAL ASSISTANCE REQUIRED. 1. For Argentina. 2. Of a general nature.

[illegible]

[illegible] basic statistics

[illegible]	[illegible]
[illegible]	[illegible]
GDP	[illegible]
GDP per capita	[illegible]
Imports	[illegible]
Exports	[illegible]
Positive balance	[illegible]
Reserves	[illegible]
Rate of exchange	[illegible]

(since March 1967)

* According to the latest information from the International Bank for Reconstruction and Development, Argentine GDP per capita = US$ 780.

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible] tonnes	[illegible]
[illegible]	[illegible] tonnes	[illegible]
[illegible]r vehicles	[illegible] units	[illegible]

* Number of motor vehicles on the roads in December 1966: [illegible]

Inhabitants per motor vehicle: [illegible]

[illegible] Argentina – Production of petroleum by province

Province	[illegible] production
Mendoza	[illegible]
Tierra del Fuego	[illegible]
Chubut	[illegible]
Rio [illegible]	1[illegible]
Remainder	13.[illegible]
	1[illegible].7
	1[illegible]

The overall statistics of oil wells and metres drilled are summarized in the following table

Argentina – Wells completed and metres drilled (1963)

	Production	Exploration	[illegible]	Total
Wells completed	3[illegible]	1[illegible]6	23	525
Productive wells	[illegible]4	24	54	352
Thousands of metres drilled	547	[illegible]	189	942

The figures for petroleum processed and derivatives obtained are as follows:

Argentina - Petroleum processed and the principal derivatives obtained (1968)

		Thousands of m^3
Petroleum processed	Local	19,472
	Imported	2,358
	Total	21,830
Principal derivatives obtained	Ordinary motor spirit	2,959
	Special motor spirit	1,780
	Kerosene	998
	Gas oil	3,173
	Fuel oil	8,615
	Naphtha for reforming	640
	Propane and butanes	756
	Dry gas	272,280

In 1968, 2.3 million m^3 of petroleum (to a value of US $ 42.6 million) had to be imported to meet the country's requirements.

Present refining capacity (August 1969) is some 25 million m^3, with 30 million projected for 1975. Broken down, present processing capacity is:

Argentina - Processing capacity of petroleum distilleries

Enterprise	Topping	Vacuum	Thermal cracking	Catalytic cracking	Catalytic reforming	Alkylation	Polymerization
	(Thousands of m³ per calendar day, August 1967)						
YPF	41.3	.1	11.4	3.5	2.5	0.3	0.48
Esso	11.3	2.2	3.3	2.5	-	-	-
Shell	14.0	.9	4.9	2.8	-	-	-
Other enterprises	1.9	2.5	0.7	-	-	-	-
PAS**	-	-	-	-	2.5	-	-
Total	68.4	17.5	19.6	14.8	5.0	0.3	0.48

* A catalytic reforming plant being set up by Esso, with a capacity of 1,400 m^3/day, is at the final proof stage.

** Petroquímica Argentina S.A., a petrochemical undertaking.

Source: For the above table and almost all the data given up to now under 5.1., the National Directorate for Power and Fuels (Dirección Nacional de Energía y Combustibles), Boletín Estadístico 196 .

The petrochemical raw material used is virgin naphtha obtained from topping crude of the paraffinic type in the case of the northern deposits, of the naphthenic type in the south, and of an intermediate type in the case of the Mendoza deposits. In view of the steady trend towards self-supply in regard to petroleum and the continuous increase in catalytic cracking capacity, an adequate supply of virgin naphtha for petrochemical use can be anticipated. In the event of a shortage, it would always be possible and economic to import virgin naphthas, or light or reconstituted crudes containing a high proportion of naphthas.

For details on sedimentary basins, pipelines and distilleries, see map No. 1 in the annexes.

5.3. Natural gas

With reserves estimated at 300,000 million m^3, the characteristics of the gas obtained from the two main source areas are approximately:

Component	Composition (molar %)	
	Northern Gas Pipeline (at Rosario)	Southern Gas Pipeline (at Bahía Blanca)
C_1	83.6	86.5
C_2	5.6	4.4
C_3	1.9	1.7
C_4	0.3	0.5
C_{5+}	0.2	0.4
CO_2	1.8	4.1
N_2	1.6	1.3
	100,0	100,0

The present combined capacity of the two pipelines is 17 million m^3/day, a capacity which it is bound to increase considerably by 1972/1973 - see details in Annex 1 ("Main gas pipelines of Argentina").

It is estimated that the Southern Pipeline will carry 15 million m^3/day by 1972 or by 1973 at the latest, thus ensuring the provision of raw material (ethane) for the ethylene plant planned to be set up at Bahía Blanca (100,000 tonnes/year of ethylene).

Regarding the Northern Pipeline, the steady decline in the existing reserves in the Campo Durán area (Province of Salta) has led to exploration for new gas strata in this region. In addition, an agreement signed with Bolivia in 1968 provides for the purchase, from 1970 on, of 4 million m^3/day of natural gas from the Bolivian gas strata for the first 7 years, and 4.5 million m^3/day for the remaining 13 years - the agreement covering a period of 20 years. Thus the Northern Pipeline (Campo Durán - Buenos Aires) would be in a position to reach its maximum carrying capacity, of 7 million m^3/day, by the second half of 1970.

In these circumstances, there would also be no problem regarding the project for a plant for producing ethylene via ethane in the Rosario area (San Jerónimo Sur) with a planned capacity of 75,000 tonnes/year of ethylene.

During the current year (1969), average flow in the two pipelines has been approximately (in millions of m^3/day):

Season	Northern Pipeline (at Rosario)	Southern Pipeline (at Bahía Blanca)
Winter	4.5	6.5
Summer	5.5	5.5

The production of natural gas was 7,065 million m^3 in 1968, with the following distribution of production by province:

Santa Cruz	47.2 %
Salta	33.6 %
Remainder	19.2 %

At the present time ethane is used in Argentina as a raw material in the manufacture of ammonia, methanol and carbon sulphide. Ethane, which has not so far been recovered in Argentina, is the planned raw material for two projects for ethylene plants (Dow Química at Bahía Blanca, Province of Buenos Aires, and Hydrocarbon S.A. at San Jerónimo Sur, Santa Fe). Intensities of ethane recovery between 60 per cent and 80 per cent are being considered, this is an economic rather than a technical problem. The question of propane and butanes will be taken up under 5.4.

5.3. Refinery gas

The production of refinery gas in 1967 was 814.7 million m^3, with the following distribution of consumption:

Consumption	Millions of m^3 (1967)
In distilleries	209.5
Supplied to Gas del Estado	3.3
Supplied to petrochemical plants	45.3
Not utilized	56.6
	314.7

The producing distilleries were:

Argentina - Production of refinery gas

Distillery	Province	Production (millions of m^3)	
		1967	1968
YPF, La Plata	Buenos Aires	82.7	42.5
YPF, Luján de Cuyo	Mendoza	61.2	84.7
Shell Dock Sud	Buenos Aires	35.3	75.3
Esso Company	Buenos Aires	37.7	39.2
Others	Various provinces	37.8	20.6
Total	-	314.7	262.3

Source: National Directorate for Power and Fuels.

At the present time, a part only of the gas from the La Plata distillery is used as a raw material for an undertaking producing ethylene (Ipako), which is planning to increase its capacity from 12,000 tonnes/year to 60,000 tonnes/year with refinery gas which is now being produced by the expanded La Plata distillery, supplemented by small quantities of naphtha.

The composition of the La Plata gas varied between the following values in 1967:

La Plata refinery gas

Component	Molar %
Hydrogen	9 - 11
Methane	45 - 50
Ethane	14 - 16
Ethylene	4 - 7
Propane and propylene	6 - 10
Nitrogen and inert substances	11 - 15
	100

Source: Fundación Investigaciones Económicas Latinoamericanas (FIEL), "Estructura de Costos Industriales en la ALALC", chapter on ethylene.

5.4. Propane and butanes

Argentina produces insufficient propane and butanes to meet local demand, and more than 50 percent had to be imported in 1967, as is shown in the following table:

Argentina - Propane and butanes
(thousands of tonnes/year)

Product	Domestic production [1]	Imported	Total
Propane	134.7 [2]	86.0	220.7
Butanes	184.9 [3]	280.0	464.9
Total liquified petroleum gases (LPG)	319.6	366.0 [4]	685.6

1) Produced by the YPF and Esso distilleries and the PASA undertaking.
2) Includes 38,000 tonnes of natural gas, recovered.
3) Includes 54,600 tonnes of natural gas, recovered.
4) In 1966, 325,300 tonnes of LPG were imported (US $ 10.4 million).

Local production of LPG is expected to be insufficient for several years owing to the increasing consumption of liquified gases in Argentina, in spite of the expansion of production and recovery. The gap

foreseen for 1975 is some 15,000 tonnes of liquefied gas (a mixture of propane and butanes in a variable proportion averaging 30 - 35 per cent propane and 65 - 70 per cent butanes). The shortage has led to a policy of restricting the use of these hydrocarbons as petrochemical raw materials.

The company PASA (Petroquímica Argentina S.A.), which at the present time produces ethylene from naphtha, has submitted a project for replacing its small existing plant (capacity 14,000 tonnes/year) with a large unit capable of producing 200,000 tonnes/year of ethylene by means of naphtha cracking.

The following table gives data on reserves and production of petrochemical raw materials:

Argentina - Reserves and production of petrochemical raw materials

Raw material	Reserves	Production			
		1966	1967	1967	1968
Petroleum	600 million m^3	5.1 million tonnes	14.1 million tonnes	16.4 million tonnes	17.5 million tonnes
Natural gas (thousands of millions of m^3)	300	1.7	6.2	6.5	7.1
Refinery gas (millions of m^3)	-	145.5	208.1	314.7	262.3

Sources: National Directorate for Power and Fuels, and other sources.

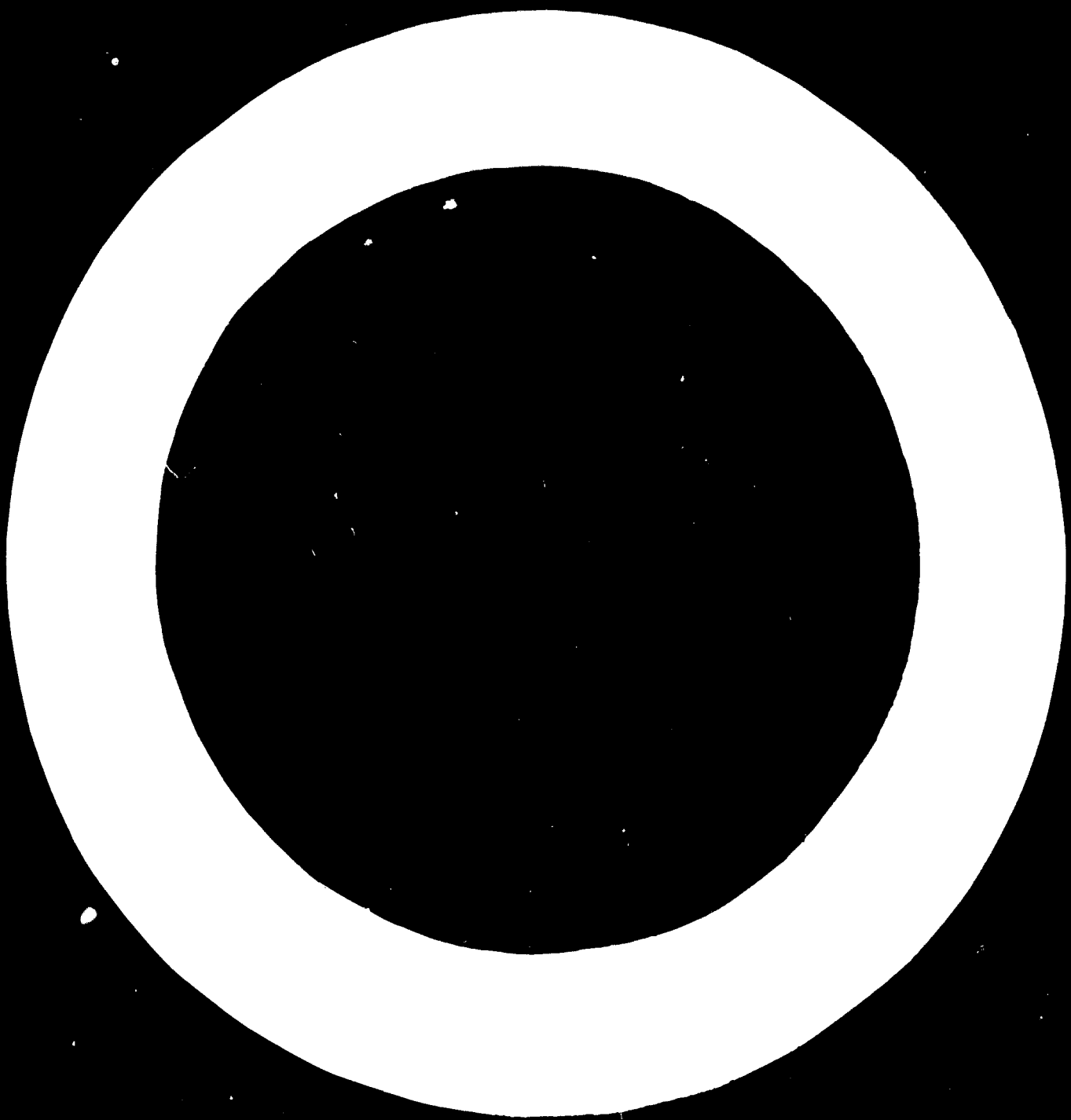
Installed Capacity, Output, Trade, Projected Demand and Prices

Table 1.: Argentina. Petrochemical products. Installed capacity, output and trade (1967)*

LAFTA nomenclature**	Product	Installed capacity thousands of tonnes	Output thousands of tonnes	Exports		Imports	
				Tonnes	Thousands of US$	Tonnes	Thousands of US$
1	2	3	4	5	6	7	8
01.2.01	Chlorine	[illegible]	[illegible]	[illegible]	10.4	[illegible]	-
[illegible]	Acetylene black, lampblack, etc.	24.0	[illegible]	4,260.2	[illegible]	1,[illegible]75.4	[illegible]
[illegible]	Carbon bisulphide	19.5	5.1	-	-	[illegible]	0.2
16.0.01	Liquefied ammonia	9.0	[illegible]	[illegible]	21.0	2,905.5	334.2
[illegible]	Ethylene	37.0	[illegible]	-	-	-	-
[illegible]	Butadiene	32.0	[illegible]	[illegible]	1,[illegible].0	-	-
01.5.01	Styrene	16.0	14.9	249.4	11.3	1,[illegible].2	[illegible]
01.5.02	Benzene	113.0	34.2	[illegible],726.5	[illegible]	1.0	1.0
01.5.04	Xylenes (O-xilene)		6.5	-	-	200.1	12.9
01.5.05	Ethyl benzene	34.0	17.9	-	-	[illegible],370.3	[illegible]
02.1.08	Carbon tetrachloride	3.2	2.3	37.2	7.0	-	-
02.1.11	Vinyl chloride	27.0	17.6	-	-	[illegible]	[illegible]
02.1.12	Tricloroethylene	6.5	3.2	54.[illegible]	[illegible]	[illegible]	[illegible]

Source: Fifth Sectoral Meeting on the Chemical Industry (19 August 1968), Montevideo, Uruguay (ID/WG.[illegible]/7)

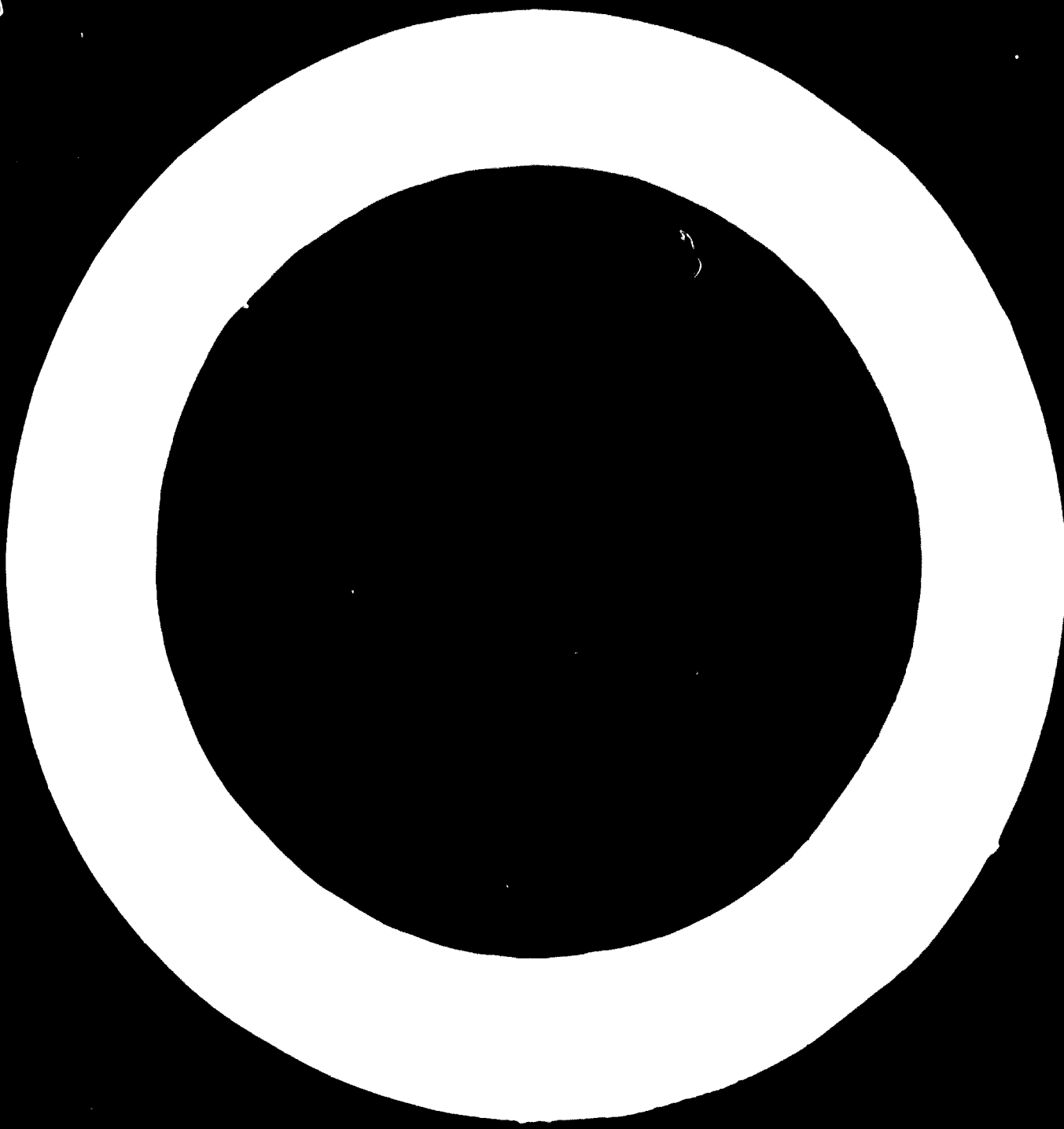
** Brussels Nomenclature for the Latin American Free Trade Association (LAFTA).



[illegible] 40

Table continued

ECE nomenclature **	Product	Installed capacity thousands of tonnes	Output thousands of tonnes	Imports	
1	2	3	4	5	6
[illegible].02.2.01	Hexachlorocyclohexane	6.[illegible]	[illegible]	-	
[illegible].02.3.01	Chlorobenzene	3.5	1.[illegible]	-	
[illegible].02.3.04	DDT	1.2	0.4	1[illegible]	[illegible]
[illegible].04.1.01	Methyl alcohol	[illegible].5	24[illegible]	1[illegible]	21.[illegible]
[illegible].04.1.04	Butyl alcohol	6.0	2.4	-	
[illegible].04.1.05	Octyl alcohol	-	-	-	
[illegible].04.1.11	Isopropyl alcohol	-	-	-	
[illegible].04.2.01	Ethylene glycol	-	-	-	
[illegible].04.2.05	Pentaerythritol	-	-	-	
[illegible].04.2.06	Propylene glycol	-	-	[illegible]	
[illegible].06.1.01	Phenol	3.5	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] bisphenol	[illegible]	-	[illegible]	
[illegible]	Propylene glycol ethers	-	-	[illegible]	
[illegible]	Ethylene and propylene glycols	-	-	-	
[illegible]	Polyethylene and propylene glycols	-	-	-	
[illegible]	Ethylene oxide	-	-		
[illegible]	Propylene oxide	-	-	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		



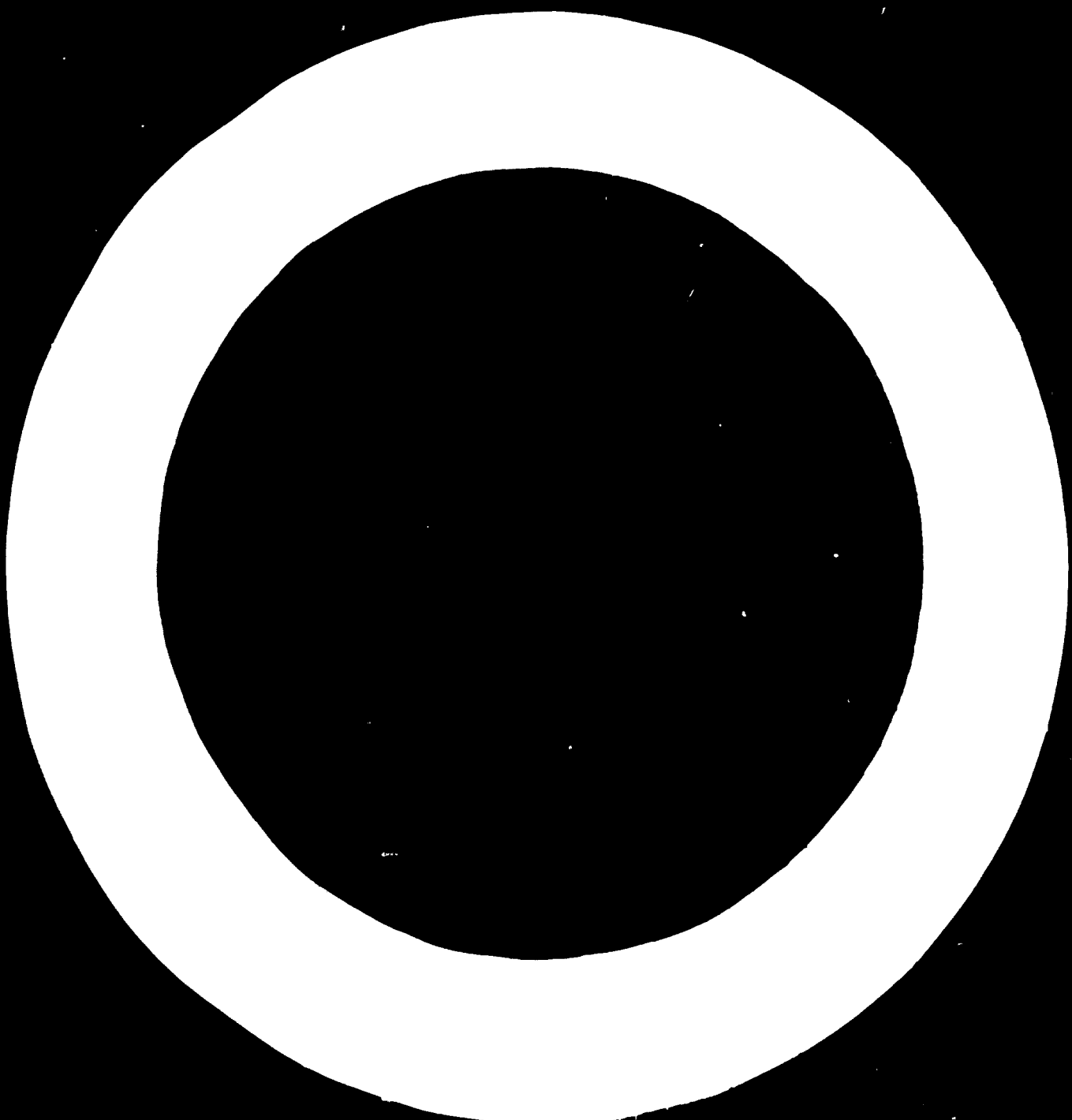


Table continued

[illegible] tariff	Product	Installed capacity thousands of tonnes	Output thousands of tonnes	Exports tonnes	Exports thousands of [illegible]	Imports tonnes	Imports thousands of [illegible]
1	2	3	[illegible]	5	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	-	-	-	-	[illegible]	[illegible]
[illegible]	Ammonium nitrate	6.0	1.0	-	-	[illegible]	[illegible]1.0
[illegible]	Ammonium sulphate	10.5	1.4	-	-	[illegible]	[illegible].6
[illegible]	Urea with nitrogen content less than or equal to 45 per cent (for use as fertilizer)	-	-	-	-	22,[illegible]18.[illegible]	[illegible],041.9
[illegible]	Ammonium phosphates	-	-	-	-	[illegible].3	2,671.5
[illegible]	Complex fertilizers	-	-	-	-	20,[illegible].7	4,583.3
[illegible]	Anti-knock compounds based on tetraethyl lead, for oil fuels	-	-	15.[illegible]	30.1	4,[illegible].1	[illegible]
[illegible]	[illegible] fuels	[illegible]	-	-	-	14,[illegible]	[illegible].7
[illegible]	Pure phenolic resins, in the liquid or solid form	6.5	4.5	-	-	105.0	1[illegible].5
[illegible]	Urea formaldehyde resins (liquid or solid)	3.5	6.3	-	-	[illegible]	1[illegible].4
[illegible]	Melamine formaldehyde resins (liquid or solid)	3.0	1.5	-	-	15.7	15.1
[illegible]	Alkyd resins	6.5	5.0	13.[illegible]	7.9	[illegible].3	4.[illegible]
[illegible]	Maleic resins	[illegible]	0.2	-	-	-	-
[illegible]	Polyester resins	[illegible]	4.[illegible]	31.[illegible]	[illegible]	-	-
[illegible]	Polyamide resins (textile), polymer 6 and 66	[illegible]	[illegible]	[illegible]	117.5	[illegible]	[illegible]

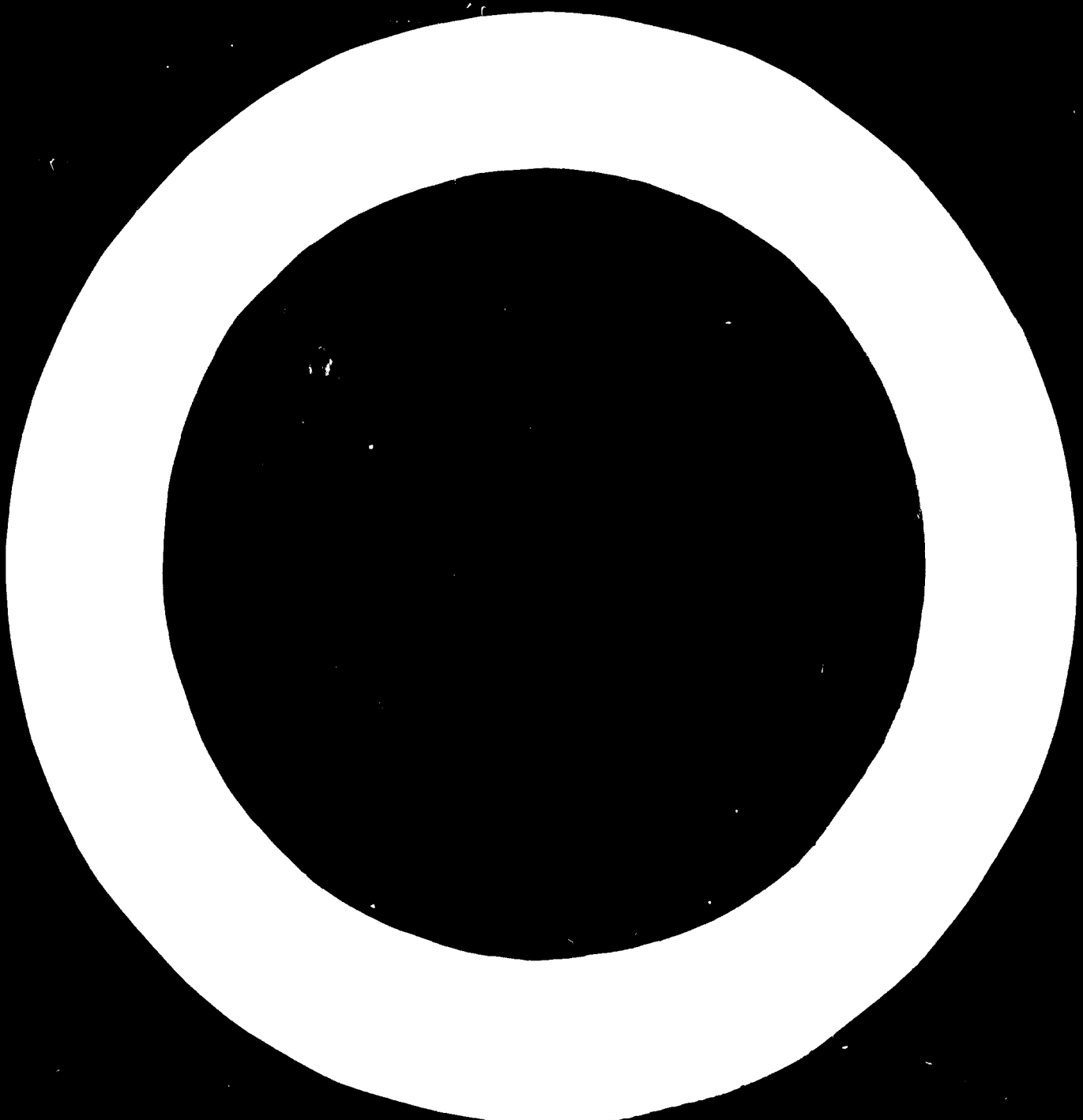
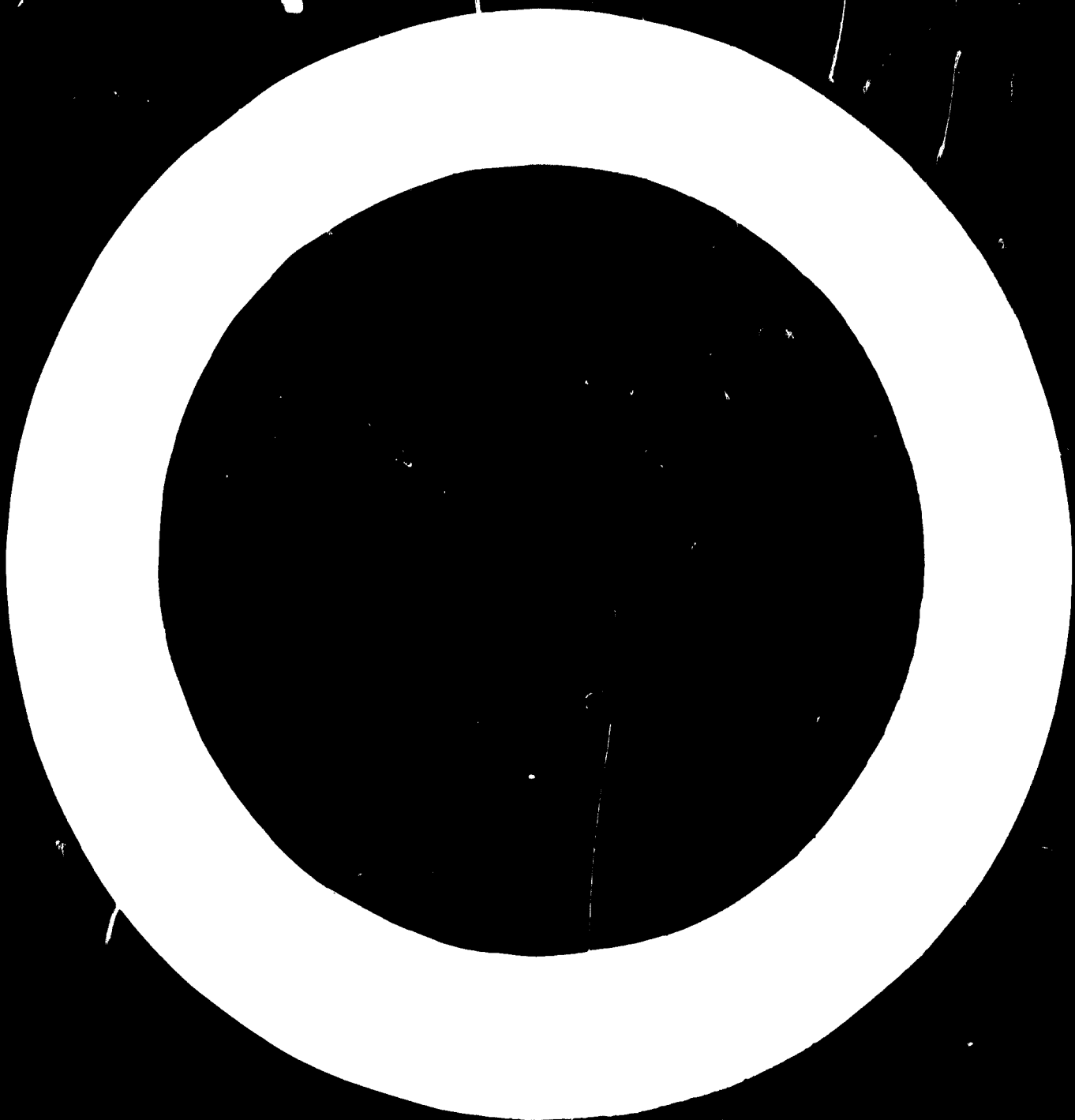
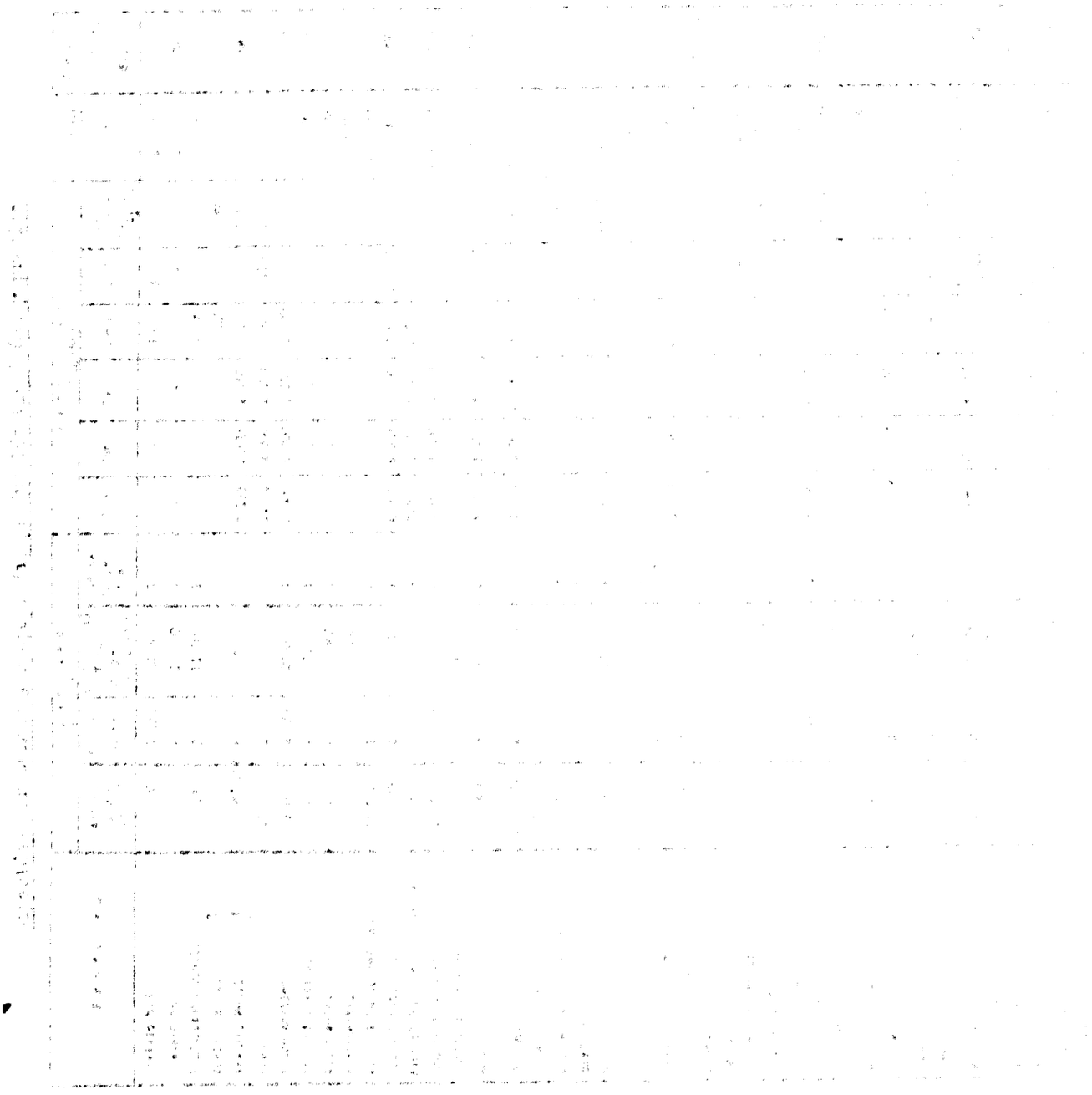
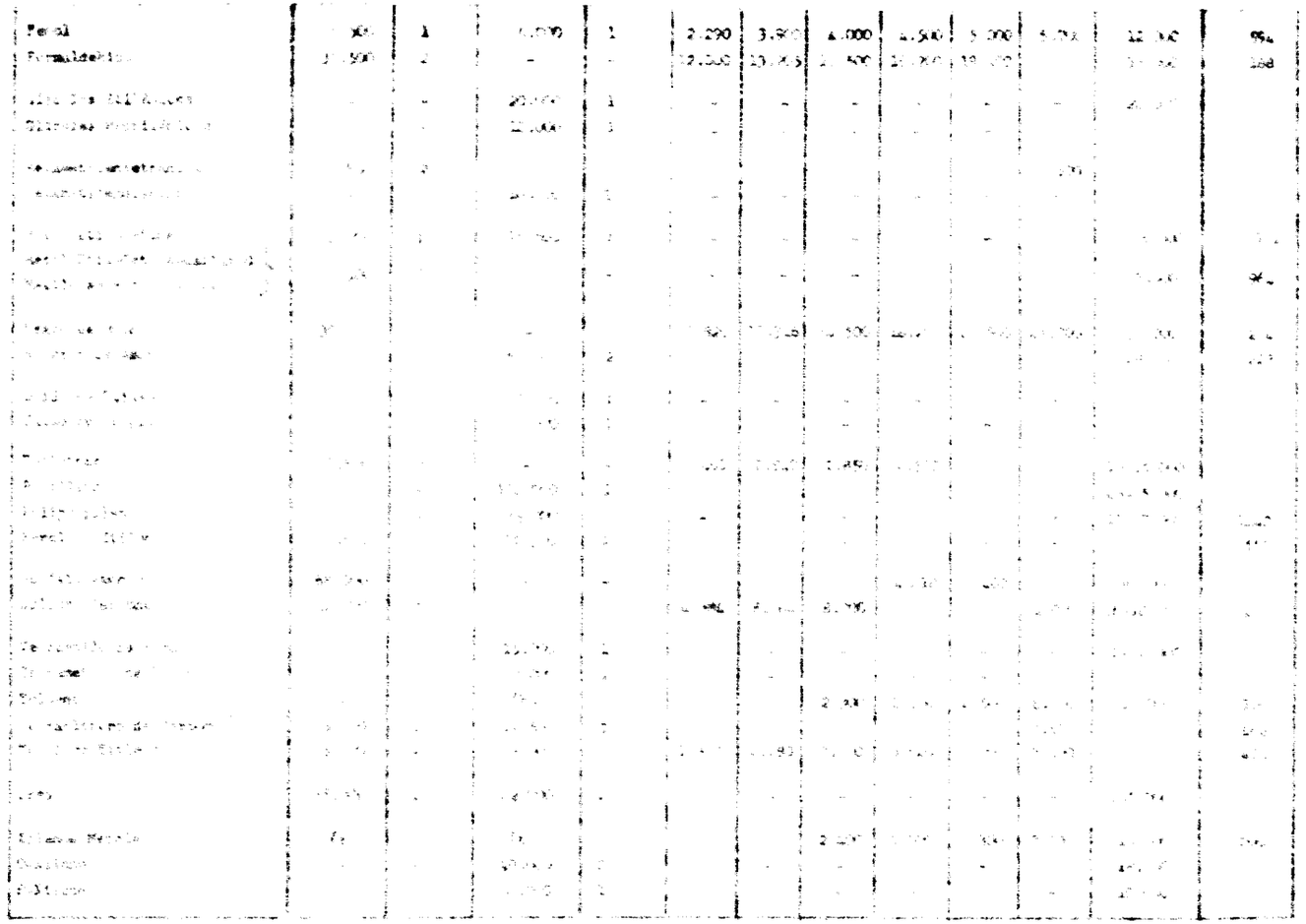


Table continued

NABALALC nomenclature **	Product	Installed capacity thousands of tonnes	Output thousands of tonnes	Exports		Imports	
				Tonnes	Thousands of US $	Tonnes	Thousands of US $
1	2	3	4	5	6	7	8
[illegible]01.2.05	Polyethylene glycol terephthalate	[illegible]	3.0	-	-	[illegible]	-
[illegible]01.1.06	Polyurethanes	6.0	[illegible].5	-	-	4.[illegible]	[illegible]
39.01.2.99	Polypropylene (polymers)	1.[illegible]	1.0	-	-	1,630.0	-
[illegible].1.01	High and low density polyethylene	25.0(b.d.)	19.3(b.d.)	2,134.2	803.9	3,104.[illegible]	1,137.[illegible]
[illegible].1.0[illegible]	Polystyrene	14.0	9.6	-	-	1,357.3	620.6
[illegible].1.[illegible]	Polyvinyl chlor. resins, homopolymers and copolymers	25.[illegible]	16.8	677.7	241.9	392.7	154.1
[illegible].1.07	Acrylic resins	2.5	1.2	[illegible].4	1.6	325.[illegible]	276.7
[illegible]	Polybutadiene-styrene rubber (SBR or [illegible])	37.6	17.1	3,132.9	1,041.6	-	-







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6.26

6.3. Projection of demand for the main petrochemical products 1975 (thousands of tonnes)

Product	Demand
I. Basic Organic Products	
Principal olefins	
Ethylene	150-250
Propylene	45-55
Butadiene	10
Principal aromatic hydrocarbons	
Benzene	80-100
Toluene	6-8
Xylenes (a)	10
Naphthalene	7
Base for lampblack	65
II. Intermediate Products	
Aromatics and allied	
O-xylene	18
P-xylene	10
Styrene	50-60
Cyclohexane	30-40
Phenol	12
Alcohols	
Methanol	30
Alcohols of higher number (C_8 to C_{10})	20
Other	
Acrylonitrile	14-16
Caprolactam (b)	25-30
Adipic acid (b)	30-35
Formaldehyde	35
Lampblack	35
EDB	20
Phthalic anhydride	20-25
Carbon sulphide	16-18
Tetraethyl lead	10-12
III. Final Product	
Acetone	6
Methyl ethyl ketone	4
Methyl isobutyl ketone	3
Acetates (C_2 to C_6)	10
Isopropanol	11-13

Table continued

	Product	Demand
IV.	Plastics	
	Thermoplastics	
	Low density polyethylene	80-90
	High density polyethylene	15-20
	PVC	50-70
	Polystyrene	30-40
	Polypropylene	10
	Polyvinyl acetate	15
	ABS	2-3
	SAN	1-2
	Acrylics	5-10
	Thermosetting	
	Phenol-formaldehyde	7
	Urea-formaldehyde	10
	Melamine	3
	Polyester	5
V.	Synthetic Rubbers	
	Styrene-butadiene	45-50
	Polybutadiene	8-10
	Neoprene	2-3
	Butyl	5
	Nitrile	2
	Polyisoprene and other	4
VI.	Synthetic Fibres	
	Polyamide	30
	Polypropylene	5-7
	Polyester	15
	Acrylics	5-10
	Total	55-62
VII.	Fertilizers (simple and complex)	
	Total N	60-120
	Total P_2O_5	40-50
	Total K_2O	15-20
VIII.	Industrial Ammonia	40-60

a) Does not include that required to produce o- and p-xylenes.

b) Alternative products.

7. Cost structure of plants producing ethylene in Argentina

In works production cost

Date: Mid-1967 — Exchange: US$1 = 350 m$n

General information	Enterprise I	Enterprise II	Enterprise III
Installed capacity (tonnes/year)	11,000	15,000	7,500
Output (tonnes/year)	8,000	11,000	5,400
Capacity utilized (%)	73	73	72
Estimated investment at mid-1967 (millions of dollars)	3.2	5.0	5.0
Year operation began	1962	1964	1965
Charge	Refinery gas	Naphtha	Propane
Purity of the ethylene obtained	99.9 %	99.9 %	95 %
Utilization of the ethylene	Polyethylene	Polyethylene	Polyethylene

	Cost factor	¢/lb	¢/lb (a)	¢/lb (b)	¢/lb
Direct cost	Charge	3.50	5.60	2.74	1.96
	Energy and other services	0.22	0.35	0.35	0.38
	Fuels	1.43	0.38	0.38	0.66
	Catalyst and chemical products	1.07	0.97	0.97	0.06
	Direct labour and supervision	0.40	0.39	0.39	0.40
	Maintenance	0.60	0.61	0.61	0.73
	Sub-total (1)	7.22	8.80	5.34	4.19
Indirect cost	Depreciation	1.82	2.07	2.07	1.14
	Overheads (including direct labour)	0.40	0.51	0.51	0.33
	Insurance	0.10	0.08	0.08	0.27
	Sub-total (2)	2.32	2.66	2.66	1.74
Sub-total (3) = (1) + (2)		9.54	11.46	8.60	5.93
Credit for by-products (4)		1.41	0.91	0.91	1.69
Ex-works production cost (3) - (4)		8.13	10.55	7.69	4.24

Table continued

(a) With naphtha at US $ 41/tonne

(b) With naphtha at US $ 20/tonne (conditional on export of the corresponding polyethylene produced)

Source: FIEL, "Estructura de Costos Industriales en la ALALC", chapter on ethylene.

The preceding table shows that, in 1967, production costs for ethylene in Argentina were practically double the international price (4 ¢ / lb.) These high costs, which are still practically at the same level now (August 1969), are mainly due to the following factors:*

a) The low capacity of existing plants, with the result that depreciation and indirect costs account for a significant proportion of production costs;

b) The existing price of raw materials, generally above the international price;

c) Use of the by-products obtained as fuels and for other unremunerative purposes, owing to the low local demand at present for such by-products as petrochemical raw materials.

The cost levels in question will steadily improve as a result of Decree 4,271, which establishes prices at an international level for petrochemical raw materials (from 1 November 1969), and the setting up of ethylene plants benefiting from economies of scale; in this regard, approval is at present being sought from the Government for the following projects:

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* For further details the chapter on ethylene in the study "Costos Industriales en la ALALC", Fundación Investigaciones Económicas Latinoamericanas (FIEL), December 1967, may be consulted.

Argentina - Projects for ethylene plants

Enterprise	Existing capacity in thousands of tonnes/year	Planned capacity in thousands of tonnes/year	Total capacity in thousands of tonnes/year	Existing or planned location	Remarks	
Dow Quim.	-	120	120	[illegible]	-	[illegible] than
Hydrocarbon S.I.	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ipako (Koppers)	12	[illegible]	60	[illegible]	[illegible]	[illegible] with [illegible]
P.A.S.A.	14	186	200	San Lorenzo [illegible], Santa Fe	Project [illegible]	[illegible]
Total	-	-	[illegible]	-	-	-

In view of the fact that projected demand for 1975 is 150,000 tonnes (maximum 250,000 tonnes), it will clearly not be possible for all these projects to be carried out.

As far as production costs are concerned, it is anticipated that, with raw materials at international prices, and plants of adequate size operating at full capacity, ethylene will be available in Argentina, by 1975/1976, at prices between 4.5 and 5.5 ¢/lb. delivered to the factory.

3. Investments in the petrochemical sector

Although it is very difficult to estimate the amount invested up to the present time in the Argentine petrochemical sector, owing to problems connected with amortization, the revaluation of assets and other difficulties, it may be said in a purely indicative way that the value probably varies around US $ 300 million.

Of greater significance is the amount represented by the petrochemical projects for which approval is currently being sought. The details are as follows:

Argentina: Petrochemical projects under consideration by the Government*

Enterprise	Investment envisaged (millions of US $)	New plant (NP) or expansion (E)
Fabricaciones Argentinas	17.7	NP
Petroquímica	13.0	NP
[illegible] Químicas Argentinas	110.0-140.0	NP
Hidrocarburos Argentinos (Hydrocarbon S.A.)	22.0	NP
Indupa	44.5	E
Ingeniero	54.0	NP
Lipeko	27.2	E
Olefinas Argentinas	46.0	NP
PASA	50.3	E
Petroquímica Sudamericana	9.0	NP
Shell	2.5	NP
Approximate total:	460-490	

* It will not be possible for all these projects to be carried out since the combined capacity would be excessive.

** See details on these enterprises in the table under 2.11.

9. Promotional enactments relevant to the petrochemical industry

9.1. Basic legislation: Acts Nos. 14780 and 14781

These two acts are mutually complementary and directed towards the same goals. They are the two most important enactments in the field of industrial policy.

9.1.1. Act No. 14780

This act was passed in 1958. It authorizes the investment of foreign capital in the form of capital goods, foreign currency, raw materials, etc., extending to it certain privileges (relating to

customs duties, exchange and/or taxation). The object is thus to bring in foreign capital, avoiding the use of local currency reserves.

Briefly, it lays down the conditions governing the investment of foreign capital, establishes the methods and procedures to be followed if the privileges provided for are to be obtained.

This Act took effect immediately from 1959, without the need for a regulating decree, through the application of its provisions to the proposals which had been submitted to the Government for its consideration.

9.1.2. Act No. 14701

This was also passed in 1958. Referred to as an act concerning the development or promotion of industry, it authorizes the executive to grant specific privileges in order to create and maintain the conditions necessary to ensure full and harmonious development of the country's industrial production. Ever since it came into force, this Act has been weakened in practice by the difficulty of devising regulations taking into account the different characteristics of each industrial sector.

Its goals are:

I. The achievement of balance of equilibrium;
II. The utilization of the country's existing and potential resources;
III. Industrial decentralization;
IV. Improvement, expansion and diversification of industrial production;
V. Technological advances in manufacturing;
VI. Meeting the needs of national defense, public health and public safety.

9.2. Decrees establishing regulations

Basic decree: 5339/63
Supplementary decree: 1756/68

9.2.1. Decree 5339/63

Purpose

To authorize the import of industrial capital goods (the import of foreign items of machinery which are not produced in the country, free of

charges) subject to certain requirements.

Requirements

(a) The investment must involve the introduction of better techniques and technology and make it possible to increase the quantity, improve the quality or lower the price of domestic production;

(b) It must involve the more effective use of domestic raw materials or semi-manufactures, directly or indirectly;

(c) It must help the trade balance, through import substitution or the development of new exports;

(d) Circulating capital resources proportionate to the investment must be available;

(e) It must directly or indirectly ensure stable employment opportunities as a result of the availability of assured markets.

(f) The production must be carried out at reasonable cost levels in relations to international prices and must help to increase the degree of domestic competition;

(g) The levels of customs protection necessary for developing the activity must be comparable with those in industrialized countries.

Duration of procedures

Procedures for obtaining government approval of the exemption take 4 - 6 months.

Future outlook

There is no expiry date.

9.2.2. Decree 1756/66

Purpose

To authorize imports of equipment not manufactured in the country, with duties reduced to 20 per cent, subject to specific requirements.

Reasons

This takes into account certain types of industrial projects which, while they are not priority projects under the terms of Decrees 5339/63 and 3113/64, are useful to the country's economy, since they meet a need in regard to the supply of goods and will assist the modernization of the production plant of undertakings with a view to

reducing costs and keeping up with technological advances taking place elsewhere in the world.

Requirements

(a) They must make it possible to reduce costs and produce at competitive levels, with a view to the gradual reduction of the duties protecting domestic industry;

(b) They must be accompanied by adequate rationalization of the undertaking, ensuring optimum productivity of the plant to be installed;

(c) They must signify an advance in the technological level of the branch concerned;

(d) They must help to raise the percentage utilization of raw materials of national origin.

Industrial activities which enjoy the benefits of these regulations

(a) Textiles, based on raw materials of national origin.

(b) Food processing, excluding beverages, sugar, confectionery, and tobacco.

(c) Chemical products, excluding perfumery, toilet products and cosmetics.

(d) Building materials.

(e) Machine tools.

(f) Manufacture of heavy equipment and parts for such equipment.

(g) Manufacture of water-resisting boilers.

(h) Leather and manufactures from leather.

(i) Industrial ceramics.

(j) The electronic industry.

Duration of procedures

Procedures for obtaining government approval of the privilege take four months.

Future outlook

During the first half of 1969, the list of industrial activities enjoying the benefits of these regulations will be expanded.

9.3. Area regulations and special regulations: Act 17,010 (operative in Tucumán)

Purpose:

Putting into effect the emergency plans necessary for the agro-industrial development of the province of Tucumán.

Benefits

It grants the following advantages: the import of equipment not manufactured in the country, free of charges; tax benefits in favour of the enterprise and of investors, not optional but automatic, and possible exemption from import duties on raw materials.
Government policy is to make as few regulations as possible regarding the application of these provisions, in order to facilitate negotiations between the public and private sectors. The benefits are consequently always subject to negotiation.

Requirements

(a) The application for benefits must relate to new enterprises or operations, or to the expansion of existing activities.
(b) They must contribute towards the economic recovery and/or the agro-industrial transformation of the province.
(c) The application must relate to technically efficient and economically profitable units.

Duration of procedures

Procedures for obtaining government approval of the privileges take three months.

Future outlook

The Act has no expiry date.

10. Specific promotional provisions for the petrochemical industry: decree 4271 (August 1969) 10.1. Benefits. 10.2. Requirements. 10.3. Decentralization. 10.4. The special case of fertilizers

10.1. Benefits

(a) Prices of the raw materials used by the petrochemical industry

From 1 November 1969, the following specially favourable prices were fixed:

Argentina: prices of petrochemical raw materials

Locality	Province	Approximate distance from La Plata-Campana km	Naphtha US $ / tonne (x)	Naphtha US $ / tonne (xx)	Methane, ethane or ethylene included in natural or refinery gas US ¢ / million BTU (x)	Methane, ethane or ethylene included in natural or refinery gas US ¢ / million BTU (xx)	Propane and butanes (extracted) US ¢/ tonne gas (x)	Propylene and butylene (included in refinery gas) US ¢/ million BTU (x)
Gral. Roca	Rio Negro	1,500	-	-	13.30	10.64	35	37
Bahía Blanca	Buenos Aires	500	-	-	23.30	18.64	35	37
San Lorenzo-Rosario	Santa Fe	300	26.0	20.8	25.30	20.24	35	37
La Plata-Campana	Buenos Aires	0	23.0	18.6	23.30	22.64	35	37
Tercero Arriba	Córdoba	800	-	-	20.30	16.24	35	37

(x) Specially favourable prices for all consumers of these petrochemical raw materials, whatever the capacity installed or to be installed (prices to be effect from 1 November 1969 to 31 December 1984.)

(xx) Specially favourable prices with an additional rebate of 20 per cent for consumers with an installed capacity of at least 120,000 tonnes/year of ethylene or 65,000 tonnes/year of benzene (prices to be in force from 1 November 1969 to 31 December 1977 only) For consumers with a capacity of at least 180,000 tonnes/year of ethylene or 97,500 tonnes/year of benzene, the additional deduction will remain in effect until 31 December 1980.

(b) Prices for fuels utilized by the petrochemical industry

Similarly, from the same date (1 November 1969), the following prices are fixed for natural or refinery gas (including any ethane or ethylene that they contain) utilized as a fuel by the petrochemical industry.

Argentina: Price of fuels for the petrochemical industry

Locality (x)	Province	Approximate distance to La Plata-Campana, km	Present price, La Plata-Campana US¢/million BTU	Reduction on the basis of location (xx) US¢/million BTU		Price (based on present La Plata price) US¢/million BTU
Gral. Roca	Río Negro	1,500	-	15	36.59	26
Bahía Blanca	Buenos Aires	500	-	5	12.20	36
San Lorenzo, Rosario	Santa Fe	300	-	3	7.32	38
La Plata-Campana	Buenos Aires	0	41	0	0	41
Tercero Arriba	Córdoba	800	-	8	19.52	33

x At other points in the country the price will be determined on the basis of the price at La Plata, with a reduction depending on transport costs from the source of supply to the point of consumption.

xx These reductions will remain in effect until the enterprise Gas del Estado restructures its industrial rates throughout the country.

For comparative purposes, the prices of naphtha and natural and refinery gas at the end of 1968 are given below:

Prices of hydrocarbons at the end of 1966

Product	Europe	United States of America	Argentina (official price)
Natural gas (US ¢/million BTU)	40	Gulf States: 20 North : 40	41
Refinery gas (US ¢/million BTU)	40	Gulf States: 20 North : 40	41
Fuel Oil (US ¢/million BTU)	55-110	22	41
Naphtha (US $/tonne)	18,3-22,0	30,8-33,0	44

Source: report of the Commission for the Study of Petrochemical Raw Materials (Decree 4636/66).

This table, compared with the two preceding tables, shows that petrochemical raw materials will be priced in Argentina at minimum international price levels (natural and refinery gas in the United States and naphtha in Europe), and that fuel for the petrochemical industry will have prices intermediate between those prevailing in the United States and in Europe.

(c) Tax benefits and other privileges

Beginning 36 months after the approval of the project of a petrochemical enterprise, income tax rebates are 100 per cent during the first two financial years, decreasing subsequently each year until they reach 10 per cent in the eighth year. Decree 4271 also provides for various additional advantages (exemption from stamp tax, deferment of payment of the tax in lieu of the duty on property gifts, etc.). Alternatively, in the case of enterprises which waive these tax benefits, investors can substract from income up to 70 per cent of the amounts invested in the relevant fiscal year.

Enterprises whose project is approved are authorized to import, free of duty, equipment which domestic industry is not in a position to supply for reasons of price or quality (Decree 5339/63), both for the plant producing petrochemical products and for producers of non-petrochemical input interrelated with the plants engaged in the activity being promoted.

(d) Automatic granting of benefits

Any domestic or foreign enterprise may, at any time, take advantage of the benefits of this Decree, on an open-door basis, the only limitations being those which the enterprises impose on themselves on the basis of the demand for the product which it is proposed to manufacture.

10.2. Requirements

(a) Suitable financial structure, utilization of advanced technology and a size of plant permitting production at reasonable prices

(b) A investment equivalent to 1 / of total investment, to ensure that the project is carried out and the agreed schedule adhered to

(c) Decree 4271 fixes import duties for the main basic petrochemical products (ethylene, propylene, butylenes, butadiene and aromatics) for the following periods and at the following rates:

Period	Import duties
1 November 1959 - 31 December 1972	Between 0 and 40 per cent
1 January 1973 - 31 December 1975	Between 20 and 30 per cent
1 January 1976 on	Between 10 and 20 per cent

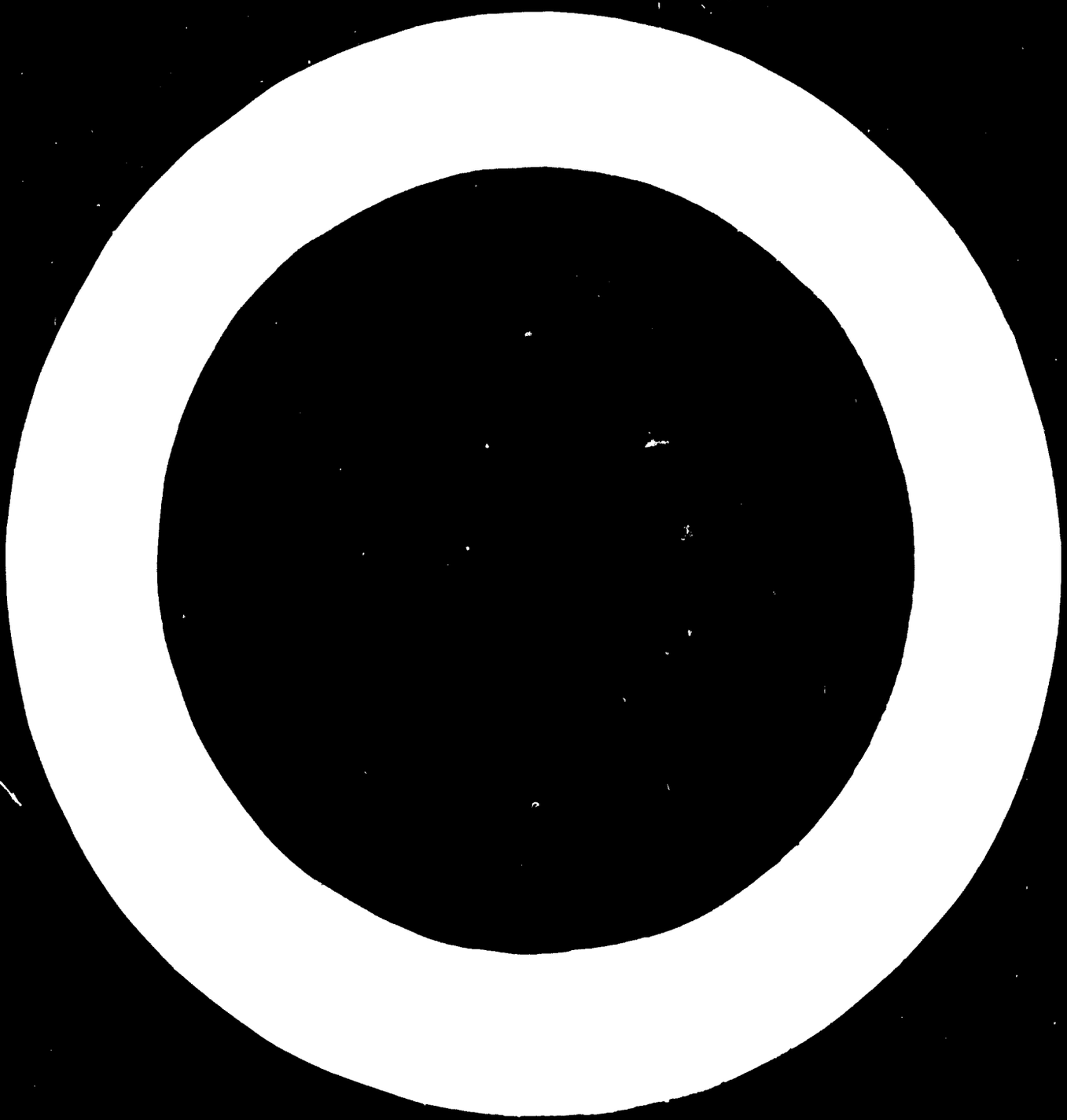
For the derivatives of these products, the Secretariat for Industry, after consulting the enterprises concerned, will propose to the Executive decreasing import duties, between the present values (which are around 80 per cent for immediate derivatives and rise to around 100 per cent for more elaborate derivatives) and the values which it is hoped to reach by 1976 (20-30 per cent for basic products and 30-40 per cent for more complex derivatives). The rates for 1976 would represent a degree of protection compatible with plants enjoying economies of scale and operating at full capacity with raw materials at international price levels.

10.3. Decentralization

In order to contribute towards solving the problems that arise out of the concentration in Greater Buenos Aires and the surrounding areas of almost half the population and manufacturing activity of Argentina, Decree 4271 restricts benefits for this area. Decentralization is also encouraged by the fixing of prices for raw materials and fuels inversely proportionate to the distance of the enterprise concerned from the Greater Buenos Aires area.

10.4. The special case of fertilizers

In view of their special importance for Argentina farming, there will be special promotional provisions applying to the production of fertilizers, and the benefits extended under Decree 4271 to this sector are therefore temporary in character. In other words, it can be anticipated that the manufacture of nitrogenous fertilizers (ammonia, urea ammonium salts) will receive even more preferential treatment than that extended to them under this Decree as petrochemical derivatives.



PLANTAS PETROQUIMICAS Y AFINES EN LA ARGENTINA (1969)

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12. Annexes

Map 1 (Petroleum in the Argentine Republic)

Annex 1: Argentina – Main gas pipelines

Annex 2: Argentina – Apparent consumption of plastic materials

Annex 3: Argentine production of man-made fibres

Annex 4: Argentina – Plants producing 98 per cent sulphuric acid

Annex 5: Argentina – Plants producing caustic soda and chlorine

Annex 6: Agreement on surpluses and shortages within the Latin American Free Trade area

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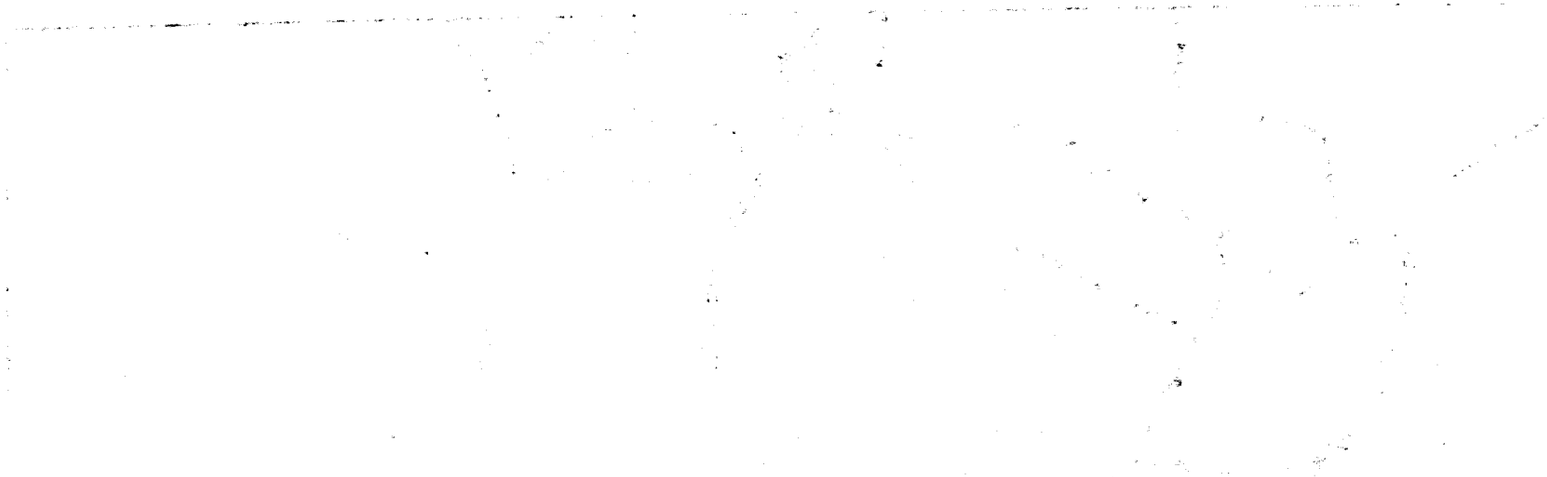

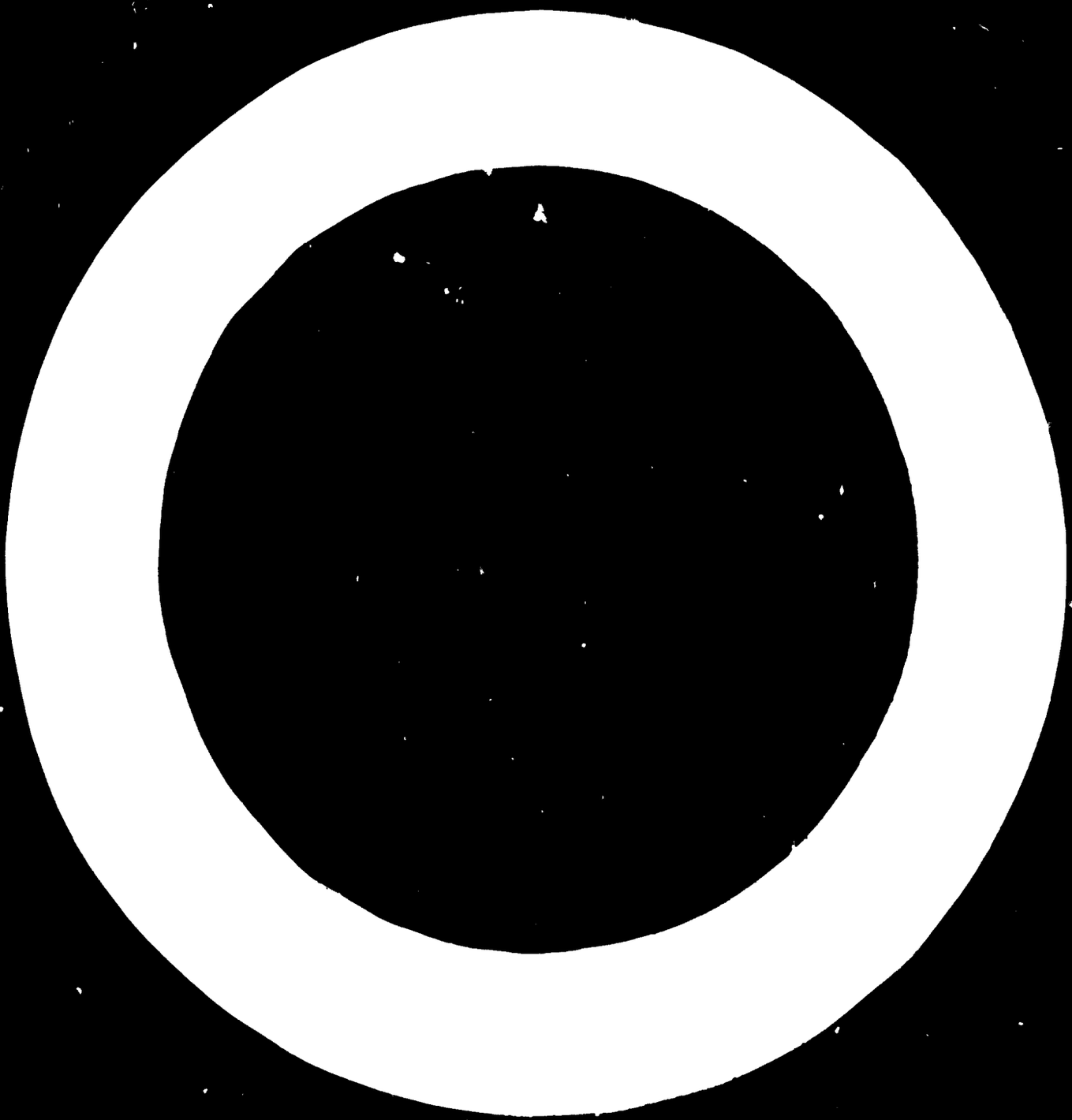

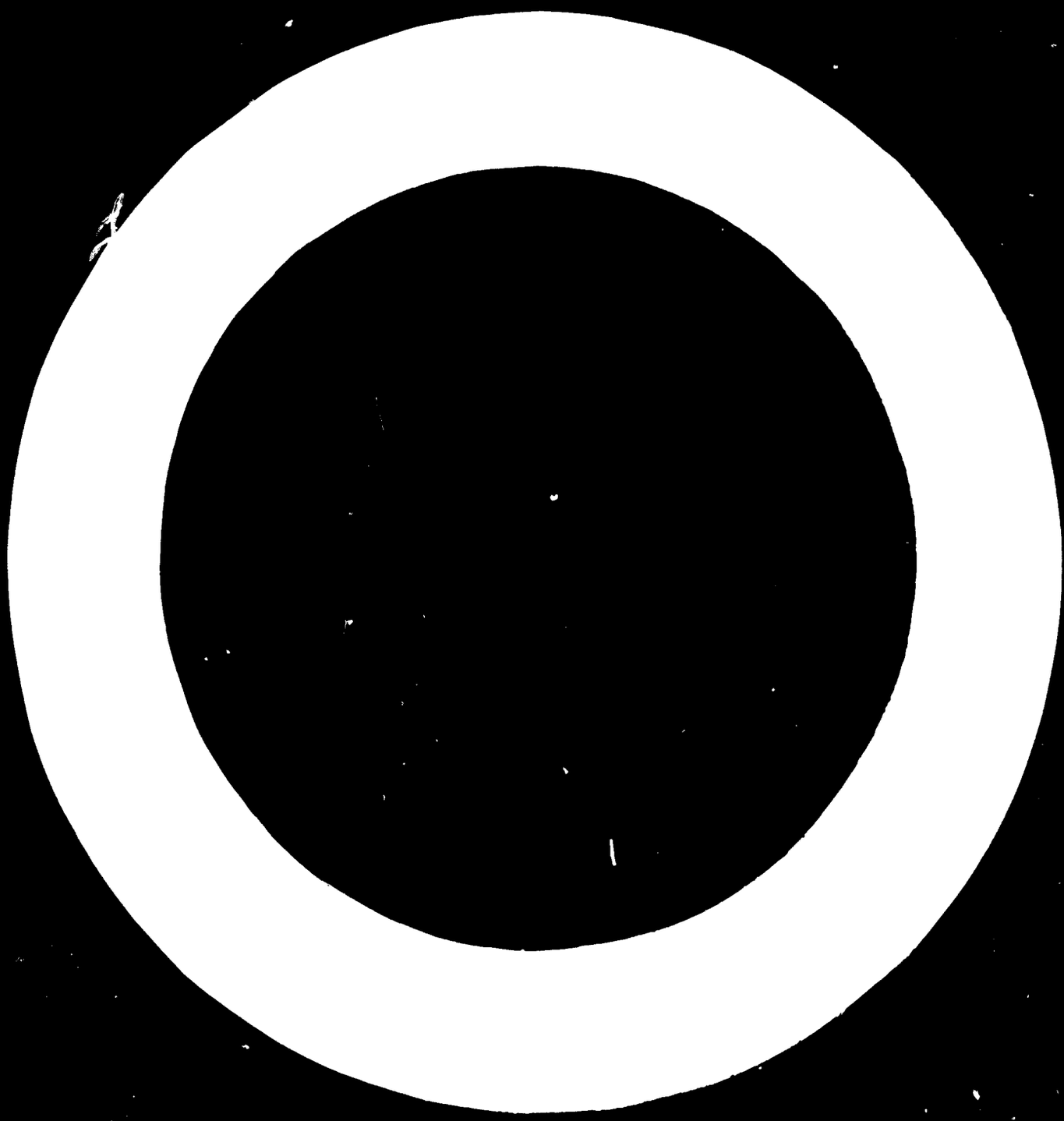

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Page 40

ANNEX 1

ARGENTINA - MAIN GAS PIPELINES

Name	State of completion	Diameter in inches	Length in km.	Carrying capacity (millions of m³ day)
Comodoro Rivadavia-Buenos Aires	In use	10 3/4	1,695	1.0
Pico Truncado-Buenos Aires	In use	30	1,600	10.0 *
Campo Durán-Buenos Aires	In use	24	1,744	7.0 **
Plaza Huincul-General Conesa	In use	8	462	0.8
Neuquén-Bahía Blanca	1/	24	570	4.0
Cóndor-Pico Truncado	2/	30	670	10.0

1/ Under construction.

2/ Contract in process of being awarded.

Sources: (a) National Directorate for Power and Fuels.

(b) Petrotecnia, year XII, No. 2.

* Known as the Southern Gas Pipeline

** Known as the Northern Gas Pipeline

ANNEX 2

ARGENTINA - APPARENT CONSUMPTION OF PLASTIC MATERIALS

1967, 1968 and estimates for 1975

(thousand of tonnes)

	1967	1968	1975 est. min.	1975 est. max.
THERMOSETTING				
Phenol-formaldehyde 1/	3.5	3.65	6	8
Aminoplastics (urea and melamine plastics)	6.9	7.9	12	15
Alkyds (including maleics)	5.5	5.8	10	12
Polyesters	3.5	4.0	8	10
Epoxy	0.4	0.54	1.5	2
Polyurethanes	3.5	4.5	10	12
1/ Including moulding powders and solid and liquid resins.	23.7	26.39	47.5	59
THERMOPLASTICS				
Low density polyethylene	17.6	21.8	65	70
High density polyethylene	1.6	1.8	6	10
Polypropylene (including copolymers and ruffia)	1.6	2	8	12
Polyvinyl chloride and copolymers	16	18	50	55
Polystyrene 1/ and copolymers ABS and SA.	10.3	13.3	30	35
Polyvinyl acetate	3.3	3.9	8	10
Polyacrylics	1.6	2.0	4	6
Polyamides (incl. 6, 6, 11 and 12)	0.34	0.5	1.5	2
Celluloses (incl. cellophane)	5.8	6.2	8	10
Miscellaneous (incl. fluoroplastics, polycarbonates, acetals, vinylidene polychloride, polybutanes and others)	0.5	0.7	3	4
Totals	59.04	70.7	178.5	219
Grand Total	82.74	97.09	218.0	278
Per capita consumption in kg	3.5	4.1	8.0	10.0

1/ Includes expanded polystyrene.

Source: Noticiero del Plástico, May 1969 (Special number)

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2 OF 2

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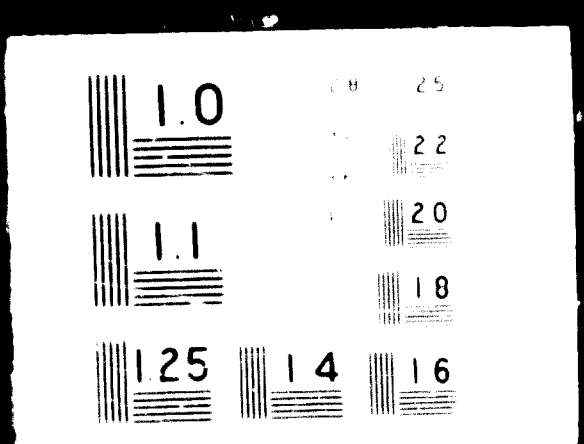

ANNEX 3

ARGENTINE PRODUCTION OF MAN-MADE FIBRES (tonnes)

Products	1961	1962	1963	1964	1965	1966	1967	1968
(1) Cellulosic fibres								
Textile rayon yarn	7,012	4,736	4,179	6,253	7,807	7,272	5,287	5,660
Rayon yarn, for rope	3,228	3,268	1,922	3,699	3,771	2,458	367	530
Rayon staple	4,266	2,408	3,312	5,118	5,630	3,675	3,504	3,400
Cellulose acetate yarn	1,672	899	1,162	1,870	2,401	2,136	1,900	1,860
Total cellulosic fibres	16,178	11,303	10,535	17,040	19,609	15,541	13,058	11,450
(2) Synthetic fibres								
Polyamide yarn, textile	1,805	2,239	3,809	5,842	7,237	7,691	9,072	5,360
Polyamide yarn, industrial	-	-	200	1,222	2,387	2,746	2,391	2,200
Polyamide staple fibre	-	-	-	-	-	72	130	120
Polypropylene yarn	-	5	45	107	203	515	1,162	1,240
Polypropylene fibre	-	-	42	106	68	22	68	70
Polyester yarn	-	-	130	302	372	621	859	1,000
Polyester fibre	-	-	231	2,531	2,854	3,029	2,372	3,340
Total synthetic fibres	1,805	2,244	4,557	10,117	13,015	14,727	17,554	13,330
Total man-made fibres	17,983	13,547	15,142	27,157	32,624	30,418	30,612	24,780

Source: Noticiero del Plástico, May 1969 (Special number)

ANNEX 4

ARGENTINA - PLANTS PRODUCING 98 PER CENT SULPHURIC ACID *

(Situation in April 19[illegible])

Enterprise	Location of the factory	Inst. capac. thousand of tonnes/year	Raw material	Process
Cía Química	Dock Sud; Pcia. Bs. Aires	14.0	Sulphur	Contact
Comisión Nacional Energía Atómica	San [illegible]fael, Pcia. [illegible]	4.0	"	"
Duperial	San Lorenzo, Pcia. [illegible]	2.5	"	"
Fabricaciones Militares	[illegible], Pcia. Bs. Aires	[illegible]23.0	"	"
	Río III, Pcia. Córdoba	13.2	"	"
Grassi	[illegible], Pcia. [illegible]	[illegible].5	"	"
Obras Sanitarias de la Nación	[illegible], Pcia. Buenos Aires	(1) 2[illegible]	"	Lead chamber
Petrosur	Campana, Pcia. Buenos Aires	(2) 40.[illegible]	"	Contact
S.O.M.I.S.A.	San [illegible], Pcia. Bs.As.	3.[illegible]	Cooking plant gas	"
Sulfacid	Puerto [illegible], Pcia. Sta. Fe	35.0	Blende	"
Zárate	Zárate, Pcia. Bs. Aires	36.5	Sulphur and blende	"
TOTAL		2[illegible]		

1/ 78 per cent sulphuric acid expressed in 98 per cent acid.
2/ For fertilizers

* Output:	Year	Thousands of tonnes
	1958	117
	1962	118
	1967	[illegible]
	1968	[illegible]
	1975 (projection)	[illegible]

Source: PIEL, "Estructura de Costos Industriales en la U.R.S.S.", brought up to date by the Argentine Association of Chemical Engineers.

ANNEX 5

ARGENTINA - PLANTS PRODUCING CAUSTIC SODA AND CHLORINE *

(situation in June 1968)

Enterprise	Location of the factory	Inst.cap.for prod. 100 % NaOH thousands of tonnes/year	Year operations began	Type of cell
Celulosa Argentina	Capitán Bermúdez, Pcia. Sta. Fe	33.0	1929	Diaphragm
Indupa	Cinco Saltos, Pcia. Río Negro	25.0	1951	Mercury
Atanor	Río III, Pcia. Córdoba	15.0	1950	"
Ifa Quím[illegible]	Dock Sud, Pcia. Bs. Aires	4.3	1940	"
Monsanto	Chacras de Coria, Pcia. Mendoza	3.0	1958	"
Dow Química	Aldo Bonzi, Pcia. Bs. Aires	4.5	19[illegible]	"
Papelera Río Paraná	Campana, Pcia. Bs. Aires	1.2	1952	"
Ingenio Ledesma	Ledesma, Pcia. Jujuy	2.5	1965	"
TOTAL		88.5 **		

* Output of 100 percent NaOH in 1967 = 64,200 tonnes, in the form of a solution of approx. 50 per cent NaOH.

** In 19[illegible] there was an additional capacity of about 8,000 tonnes/year of 100 per cent NaOH (in the form of a 50 per cent solution) produced by causticization of sodium carbonate.

ANNEX 6

AGREEMENT ON SURPLUSES AND SHORTAGES WITHIN THE LATIN AMERICAN FREE TRADE AREA

The existing agreements on national lists and complementarity agreements signed by the members of the Latin American Free Trade Association (LAFTA) provide for concessions of a permanent nature. The result of this has been that the concessions granted by the members of LAFTA have been very few and infrequent.

To remedy this problem and facilitate the development of their enterprises through the construction of plants on an economic scale with acceptable degrees of utilization of capacity, petrochemical entrepreneurs of the area have devised what is known as a system of surpluses and shortages.

This system provides for temporary concessions for the petrochemical industry granted by those countries where there is a shortage to countries of the area which happen to have surpluses of the products concerned. The concession is granted up to the amount of the deficit and for the duration of the shortage, and when the conditions disappear the concessions end.

A mechanism of this type will make it possible to use idle capacity and develop markets without the need for premature investment.

B. Future prospects

With raw materials available at prices near to minimum domestic prices in the rest of the world, fuels at prices intermediate between those prevailing in Europe and the United States, substantial tax exemptions and a national market estimated at 400 million dollars annually for 1975 or 1976, rapid and vigorous development of the Argentine petrochemical industry can be anticipated.

The volume of sales mentioned relates to the local market only, without taking into account exports to the LAFTA area or to other countries; these might significantly increase the volume.

As is common knowledge, the attempt is being made in Latin America to solve certain problems of economies of scale by means of complimentarity agreements, providing for concessions of a permanent nature between the member countries of LAFTA. In addition, the recent agreement on surpluses and shortages, which will make possible temporary concessions to cover short-term shortages, will contribute towards the utilization of idle capacity (see annex 6).

C. Problems confronting the Argentine petrochemical industry

1. Economies of scale and idle capacity

Nearly all the petrochemical plants at present in operation in Argentina are below the minimum size for producing at prices close to international levels (the case of ethylene is indicative, with three plants with capacities of between 100,000 and 15,000 tonnes/year).

In some cases, although some plants are of a size corresponding to the medium-sized plants of the industrially developed countries, they operate with a low degree of utilization of capacity, which also leads to high production costs (this is the case, with SBR rubber, with a capacity of 87,000 tonnes/year; since going into operation in 1965, the plant has used an average of 45 per cent of its annual capacity).

These circumstances raise economic problems which are characteristic of capital-intensive industrial sectors where there is rapid obsolescence, such as the petrochemical industry. In each case, it will be necessary to study the advantages of importing at low prices in order to develop the local market and then to establish a plant enjoying economies of scale versus the establishment of a medium-sized plant or even several small units which will produce at high costs but will, on the other hand, employ labour and promote regional development within the country.

It is also becoming increasingly necessary to clarify the concept of "minimum economic size" for each petrochemical product, and to consider the desirability or otherwise of fixing an obligatory minimum plant size for each product. In Argentina, under Decree 4271, issued recently, the policy in this regard is to provide an incentive by granting a 20 per cent discount on the price of petrochemical raw materials for use in plants with minimum capacities of 120,000 tonnes/year in the case of ethylene and 65,000 tonnes/year in the case of benzene.

Lastly, problems of economies of scale and of idle capacity are naturally linked closely with integration and complementary relationships between the countries of particular areas, and in our case of the LAFTA area.

Each of these subjects individually is a problem going beyond the limits of this study.

2. Accelerated development of the petrochemical sector within the context of normal development of industry as a whole

The reduction in prices for petrochemical products and manufactures from these products expected to result from Decree 4271 may lead to difficulties in the future as a result of the replacement of competing traditional products.

Thus plastics will partially displace paper, cellophane, wood, metals and glass. Synthetic fibres may similarly, to a greater or lesser degree, replace cellulosic fibres (rayon, cellulose acetate), and cause difficulties by replacing, to some extent, two natural fibres which are in any case facing other problems (cotton in Chaco and wool in Patagonia).

The evaluation of these problems and the consideration of measures which could alleviate them are beyond the scope of this work.

D. Technical assistance required

1. For Argentina

What is necessary to help solve the problems set out in C, sections 1 and 2:

a. A general measure

The definition of the term "petrochemical product".

The criteria used by different countries in classifying industrial products as "petrochemical products" vary considerably, thus falsifying comparative statistics. It would therefore be desirable as soon as possible to lay the foundations for a uniform definition and for its acceptance by both developing and developed countries.

As was stated in A, section 10, Decree 4271 on the promotion of the petrochemical industry in Argentina defines "petrochemical products" in terms of a list which includes basic products (ethylene, propylene, butylene, butadiene and aromatics), polymers for use in plastics and textiles, elastomers, chlorinated solvents, detergents and products for livestock health. In general, it includes products for which the basic raw material is derived from petroleum or natural gas, by means of chemical operations or polymerization.

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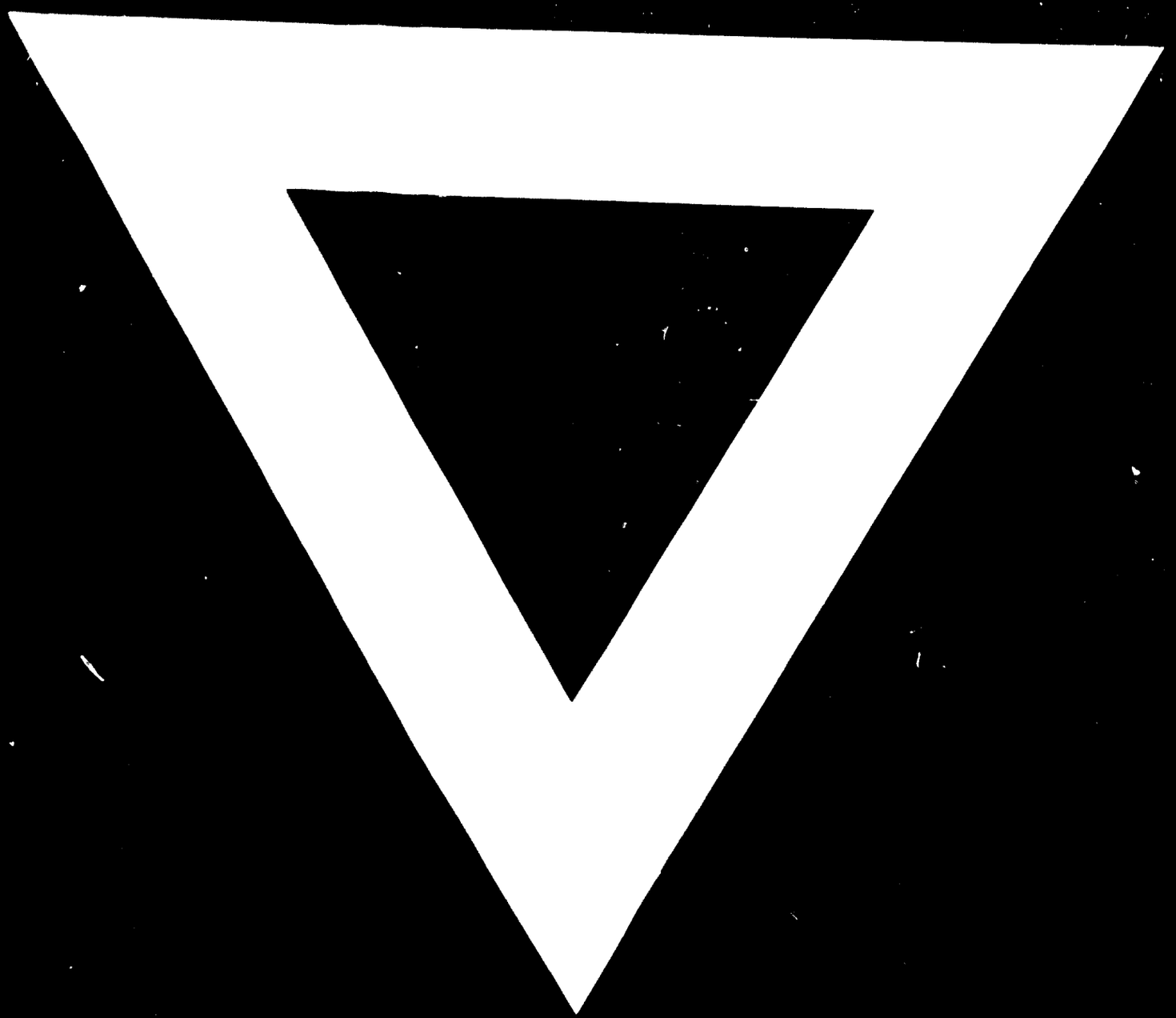

15. 3. 72